

Appl. No. 09/991,209

## REMARKS

### The Invention

The present invention provides a plant transformed with an expression cassette comprising 1) a DNA sequence encoding a ferulic acid esterase enzyme and 2) a signal sequence wherein expression of the enzyme is targeted to different plant cellular compartments, such as the ER, vacuole, golgi apparatus and apoplast resulting in an improved cell wall structure that increases the digestibility of the transformed plant compared to a corresponding non-transformed plant.

### Status of the Application

With entry of the present amendment claims 1 –12, 14 – 15, 18 – 19, 23, 25, 27 – 33 and 74 – 79 are pending in the application. Claims 13, 16, 17, 20 – 22, 24, 26, 34 – 73 have been cancelled without prejudice, and Applicants reserved the right to file further continuation applications on any subject matter disclosed in the instant application or on the subject matter of any previously or presently cancelled claim. Claims 1, 2, 8, 14, 15, 18, 23, 25, 27, 28, 29, 32 and 74 have been amended and claims 75 - 79 are new. Support for the amended claims and new claims may be found throughout the specification as filed. Applicants assert new matter has not been introduced by the amendments.

Applicants note that Claims 3-7, 15, 18-19, 30 and 32-33 are deemed to be free of the prior art.

### Claim Amendments

Claims 1 and 74 has been amended to recite that the transgenic plant is a grass plant and further to incorporate the elements of now cancelled claim 13 (the expression cassette further comprising a target polynucleotide sequence encoding a signal sequence).

The term "derived from " in claim 2 has been replaced with "obtained from".

Proper antecedent basis has been provided for all relevant terms in claims 8 and 74.

The term "end" has been included in claims 14 and 25 in reference to the 3' end and 5' end of the polynucleotide.

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Claims 27 - 28 have been amended to include "further comprises" as opposed to "is".

The phrase "introduction into a plant" has been deleted from claim 29.

New claims 75 - 79 are directed to forage plants and support is found at pages 23 and 24 of the disclosure. In addition, the expression cassette is defined as including an inducible or tissue specific plant promoter. Support is found in original claim 9 and at pages 20 and 21 of the disclosure. Claims 76 - 79 are dependent on claim 75. Claim 76 is directed to the specific FAE, FAE1. Claims 77 - 78 further define the forage plant and claim 79 is directed to a transgenic forage plant that further comprises an exogenous xylanase gene.

**35 U.S.C. §112, first paragraph.**

Claims 1-15, 18-19, 23, 25, 27-33, 57 and 74 remain rejected under 35 USC §112, first paragraph as failing to be described in the specification.

Specifically, the Examiner asserts that Applicants fail to describe a representative number of polynucleotide sequences encoding a ferulic acid esterase (FAE) and, furthermore, fail to describe structural features common to the members of the claimed genus, e.g., polynucleotides encoding a ferulic acid esterase. The Examiner has also asserted that Applicants fail to enable any plant comprising an FAE. Applicants respectfully traverse.

Regarding a "representative" number of polynucleotide sequences, one skilled in the art would be able to isolate other FAEs having esterolytic activity. Many FAEs are known in the art and Applicants have already highlighted USP 6,368,833. Moreover, the specification teaches how to make a FAE and one skilled in the art using the specification as well as the art available at the time of filing the application could determine, case by case, whether an enzyme had FAE activity. While a fair amount of experimentation may be required this experimentation would be routine and not undue experimentation.

The instant claims are directed to grass plants and Applicants have specifically taught that grass plants from two different genera may be transformed with an expression cassette including a FAE encoding polynucleotide. There is no reason to believe that other grass species could not be transformed in the same manner as Lolium and Festuca and result in targeted FAE expression.

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**35 U.S.C. §112, second paragraph.**

Claims 2, 8, 14, 25, 27 – 29 and 74 have been rejected under 35 USC §112, second paragraph as failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants assert the present claim amendments render moot the rejections under the second paragraph of section 112. Applicants further submit that the claim amendments do not change the scope of said claim but merely clarifies the language of the recited claims.

**35 U.S.C. §102(b).**

The Examiner has rejected claims 1, 2, 8, 13, 14 and 23 as anticipated by Michelson et al. (US Pat. No. 6,143,543; the '543 patent). Applicants respectfully traverse this rejection.

It is well-settled law that to anticipate a claim the prior art reference must contain each and every element within the four corners of the document and even if the claimed invention is disclosed in a printed publication, that disclosure will not suffice as prior art if it was not enabling.

The '543 Patent is directed to use of an FAE enzyme, which is expressed preferably in a fungal host cell as an enzyme additive for treating plant material, foodstuffs, and feeds. While the disclosure does state that the enzyme may also be expressed in a plant and secreted there from, there is no teaching on how this might be accomplished. The teaching of the reference is focused on high levels of gene expression and use of plants as a source of FAE for improving feed or food after extraction. There is no teaching that a FAE expressed in a plant and targeted to certain plant cellular components could be used for improving the digestibility of the plant which produces the FAE because of the improved cell wall structure.

The fact that the disclosure mentions FAE could be expressed in a plant crop does not provide the required level of enablement, which is required for a reference to anticipate the claimed invention.

The teaching of a plant expressing FAE which includes an expression cassette targeting FAE expression to particular cell compartments using signal sequences to achieve cell wall modification is missing from the '543 patent.

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35 U.S.C. §103.

The Examiner has rejected claims 1, 2, 8 – 14, 23, 25, 27 – 29, 31 and 74 as allegedly obvious over the combination of Michelson, *et al.* (US Pat. No. 6,143,543; the '543 patent) in view of Bartolome, *et al.* (Applied and Environmental Microbiology (1997) 63(1):208-212). Applicants respectfully traverse the rejection.

An essential requirement for a *prima facie* case of obviousness is whether a person skilled in the art would be motivated to modify the references to arrive at the claimed invention. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598-99 (Fed. Cir. 1988) and *In re Jones*, 21 USPQ2d 1941, 1943 (Fed. Cir. 1992).

A *prima facie* case of obviousness requires the Examiner to cite to a combination of references which (a) suggests or motivates one of skill in the art to modify their teachings to yield the claimed invention, (b) discloses the elements of the claimed invention, and (c) provides a reasonable expectation of success should the claimed invention be carried out. Failure to establish any one of these requirements precludes a finding of a *prima facie* case of obviousness and, without more, entitles Applicants to withdrawal of the rejection of the claims in issue. See e.g., *Northern Telecom Inc. v. Datapoint Corp.*, 15 USPQ2d 1321, 1323 (Fed. Cir. 1990); and *In re Dow Chemical Co.*, 837 F.2d 469, 5 USPQ2d 1529 (Fed. Cir. 1988). Applicants urge that the Examiner has failed to establish not one, but all three requirements as discussed below.

The '543 patent fails to teach or suggest the claimed invention. The reference does not disclose the elements as presently claimed nor does the reference provide a reasonable expectation of success. There is no teaching of the targeted FAE expression to plant cellular components resulting in improved cell wall structure. Moreover, there is no teaching suggesting that a forage grass plant could be transformed with a DNA encoding a FAE polypeptide and an inducible promoter.

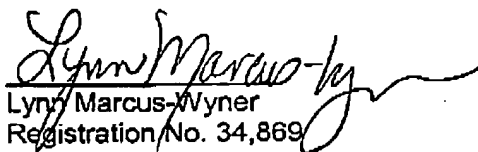
The secondary reference, Bartolome *et al.*, fails to cure the defects of the primary reference. There is no teaching regarding the recombinant expression of xylanase in plants. All Bartolome *et al.* provides is that the treatment of wheat and barley cell walls by exogenous FAE and xylanase, in combination, results in the release of certain dimers. Even if Bartolome *et al.* is combined with the '543 Patent there is no indication provided as to of how recombinant targeted expression of an FAE in grass plants could or even should be accomplished.

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CONCLUSION

In light of the above amendments, as well as the remarks, Applicants believe the pending claims are in condition for allowance and issuance of a formal Notice of Allowance at an early date is respectfully requested. If a telephone conference would expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (650) 846-7620.

Respectfully submitted,  
GENENCOR INTL., INC.

  
Lynn Marcus-Wyner  
Registration No. 34,869

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Genencor International, Inc.  
925 Page Mill Road  
Palo Alto, CA 94304  
Tel: 650-846-7620  
Fax: 650-845-6504